

Group CHAPTER 2 Probability Concepts and Applications

TRUE/FALSE

- 2.16 Given two statistically independent events (A,B), the conditional probability of $p(A|B) = p(A)$.
- 2.27 If we roll a single die twice, the probability that the sum of the pips showing on the two rolls is four (4) is $1/6$.
- 2.29 If we have a single deck of cards, the probability of drawing a spade, which is also an Ace, is $1/52$.
- 2.33 If a bucket has three black balls and seven green balls, the probability that the second ball drawn (without replacement) will be green is 0.7.
- 2.35 If a bucket has three black balls and seven green balls and we draw balls with replacement, the probability of drawing a black ball is independent of the number of balls previously drawn.
- 2.38 Assume that you have an urn containing 10 balls of the following description:

- 4 are white (W) and lettered (L)
- 2 are white (W) and numbered (N)
- 3 are yellow (Y) and lettered (L)
- 1 is yellow (Y) and numbered (N)

If you draw a numbered ball (N), the probability that this ball is white (W) is 0.667.

- 2.40 Given the following distribution

Outcome	Value of Random Variable	Probability
A	1	.4
B	2	.3
C	3	.2
D	4	.1

The expected value is 3.

- *2.42 The probability of an individual value of a continuous random variable equals zero.
- *2.46 Assume you have a Normal distribution representing the likelihood of completion times. The mean of this distribution is 10, and the standard deviation is 3. The probability of completing the project in 8 or fewer days is the same as the probability of completing the project in 12 days or more.

PROBLEMS

- 2.148 Fast Service Store has maintained daily sales records on the various size "Cool Drink" sales. Assuming that past performance is a good indicator of future sales, what is the probability of a customer purchasing a \$0.50 "Cool Drink?"

"Cool Drink" Price	Number Sold
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\$0.25	75
\$0.35	120
\$0.50	125
\$0.75	50
Total	400

2.149 A local "home TV repair service" company has two repairmen who make all of the home repairs. The company sends Repairman D on 70 percent of all jobs, because the likelihood of a "second follow-up call" within a week is only 0.08 compared to 0.20 for Repairman K. If you had a recent repair job that is going to require a second follow-up call, what is the probability that Repairman K did your initial repair work?

2.151 A market research study is being conducted to determine if a product modification will be received well by the public. A total of 1,000 consumers are questioned regarding this product. The table below provides information regarding this sample.

	Positive React ion	Neutral React ion	Negative React ion
Male	240	60	100
Female	260	220	120

- What is the probability that a randomly selected male would find this change favorable (positive)?
- What is the probability that a randomly selected person would be a female who had a negative reaction?
- If it is known that a person had a positive reaction to the study, what is the probability that the person is female?

2.152 In a production run of 200 units, there are exactly 10 defective items and 190 good items.

- What is the probability that a randomly selected item is defective?
- If two items are sampled without replacement, what is the probability that both are good?
- If two items are randomly sampled without replacement, what is the probability that the first is good but the second is defective?

2.154 Last semester, the grade distribution in a quantitative methods course had the following distribution: 10 percent A, 25 percent B, 35 percent C, 10 percent D, and 15 percent W (withdrew).

- If this grade distribution does not change this semester, what is the probability that a randomly selected student will make at least a D?
- If this grade distribution does not change this semester, what is the probability that a randomly selected student will fail the course?
- If this grade distribution does not change this semester, what is the probability that a randomly selected student who finished the course (did not withdraw) made a grade of D or better?

2.155 Colonel Motors (an automobile company) has prepared a marketing campaign for its best selling car. The focus of the campaign is quality, and it is claimed that 98 percent of the purchasers of this car have no complaints in the first year. You and your brother Theodore have each purchased one of these cars.

- What is the probability that neither of you have a complaint about the car in the first year if the advertising claim is true?

- (b) What is the probability that exactly one of you has a complaint about the car in the first year if the advertising claim is true?

2.156 Bright Product has developed the following history of daily paint sales:

Quantity Demanded	Number of Days
10	20
11	35
12	35
13	19
Total	100

Assuming this pattern of sales continues:

- (a) develop the probability distribution for daily sales
 (b) determine the probability that sales will be 11 or 12
 (c) determine the probability that sales will exceed 10
 (d) determine the average daily sales
- 2.157 A southwestern tourist city has records indicating that the average daily temperature in the summer is 82 degrees F, which is normally distributed with a standard deviation of 3 degrees F. Based on these records, determine:
- (a) the probability of a daily temperature between 79 degrees F and 85 degrees F
 (b) the probability that the daily temperature exceeds 90 degrees F
 (c) the probability that the daily temperature is below 76 degrees F
- .158 Using the table for finding the areas under normal curves, find the area under a normal curve with a mean of 200 and a standard deviation of 10 between the values of:
- (a) 200 to 205
 (b) 195 to 205
 (c) 200 to 215
 (d) 195 to 215
 (e) 186.5 to 217
- 2.159 ABC Manufacturing has 6 machines that perform a particular task. Breakdowns occur frequently for this machine. Past records indicate that the number of breakdowns that occur each day is described by the following probability distribution:

Number of Breakdowns	Probability
0	0.4
1	0.3
2	0.2
3	0.1
More than 3	0.0

- (a) What is the expected number of breakdowns in any given day?
 (b) What is the variance for this distribution?
 (c) What is the probability that there will be at least 2 breakdowns in a day?

2.160 Arrivals in a university advising office during the week of registration are known to follow a Poisson distribution with an average of 4 people arriving each hour.

- (a) What is the probability that exactly 4 people will arrive in the next hour?
- (b) What is the probability that exactly 5 people will arrive in the next hour?

2.161 The time required to complete a project is known to be normally distributed with a mean of 46 weeks and a standard deviation of 4 weeks.

- (a) What is the probability that the project is finished in 40 weeks or less?
- (b) What is the probability that the project is finished in 52 weeks or less?
- (c) There is an 80 percent chance that the project will be finished in less than how many weeks?

Supplement 1

The probability of a head on a coin is .6. If the coin is flipped 5 times, what is the probability of

- (a) exactly 3 heads
- (b) more than 2 heads
- (c) 2 to 4 heads (inclusive)